

The AMERICAN PHYSICS TEACHER

VOLUME 4, NUMBERS 1-4, 1936

Published for the
AMERICAN ASSOCIATION OF PHYSICS TEACHERS
by the
AMERICAN INSTITUTE OF PHYSICS
Incorporated

AMERICAN ASSOCIATION OF PHYSICS TEACHERS

OFFICERS OF THE ASSOCIATION

DAVID L. WEBSTER, *President*
Stanford University
Stanford University, California

F. K. RICHTMYER, *Vice-President*
Cornell University
Ithaca, New York

WILLIAM S. WEBB, *Secretary*
University of Kentucky
Lexington, Kentucky

PAUL E. KLOPSTEG, *Treasurer*
Central Scientific Company
Chicago, Illinois

EXECUTIVE COMMITTEE

J. G. BLACK
HOMER L. DODGE
PAUL E. KLOPSTEG
HARVEY B. LEMON

FREDERIC PALMER, JR.
F. K. RICHTMYER
F. A. SAUNDERS
L. W. TAYLOR
J. S. THOMPSON

WILLIAM S. WEBB
DAVID L. WEBSTER
S. R. WILLIAMS
A. G. WORTHING

THE AMERICAN PHYSICS TEACHER

BOARD OF EDITORS

DUANE ROLLER, *Editor*

Associate Editors

LEE A. DUBRIDGE
H. W. FARWELL
G. P. HARNWELL

G. R. HARRISON
K. LARK-HOROVITZ

E. F. LINDQUIST
LOUISE S. McDOWELL
L. W. TAYLOR

THE AMERICAN PHYSICS TEACHER is published quarterly in February, May, September, and December by the American Institute of Physics for the American Association of Physics Teachers.

Manuscripts for publication should be submitted to the Editor, *The American Physics Teacher*, Pupin Physics Laboratories, Columbia University, New York, N. Y.

Proof and all correspondence concerning papers in the process of publication should be addressed to the Publications Manager, American Institute of Physics, 175 Fifth Avenue, New York, New York.

Subscription price: United States and Possessions and Canada—\$3.00 per year; Foreign—\$3.50 per year.

Subscriptions and orders for back numbers should be addressed to the American Institute of Physics, Prince and Lemon Sts., Lancaster, Pa., or 175 Fifth Avenue, New York, New York. Members of the American Association of Physics Teachers receive *The American Physics Teacher*.

Advertising is not accepted for *The American Physics Teacher* but attention is called to the *Review of Scientific*

Instruments with Physics News and Views, a companion publication of the Institute, and a medium through which those who are interested in the field of physics can be reached effectively. Advertising rates and other information will be furnished by the Advertising Manager on request.

Changes of address and complaints of failure to receive *The American Physics Teacher*: Members of the American Association of Physics Teachers should address the Treasurer; other subscribers should address the Publications Manager. New copies can be sent free in response to complaints on non-delivery only if notice of non-delivery is received within three months of date of issue.

The contents of *The American Physics Teacher* can be found indexed in the *Education Index*.

Entered as second-class matter February 6, 1935, at the post office at Lancaster, Pa., under the Act of August 24, 1912.

CONTENTS

FEBRUARY, 1936

Albert Abraham Michelson: the Man and the Man of Science	HARVEY B. LEMON	1
Mass-Spectrograph and Its Uses	WALKER BLEAKNEY	12
Teaching Algebraic Signs in Optics	R. B. ABBOTT	23
Illustration of a Conservation Paradox	RICHARD M. SUTTON	26
Approaching the Study of Interference Through Acoustics	HAROLD K. SCHILLING AND WILLIAM WHITSON	27
Apparatus, Demonstrations and Laboratory Methods:		
Rotatable Stand and Switch for Crookes Tubes	W. F. POWERS AND G. W. ALDERMAN	32
Projection Cloud Chamber	M. STANLEY LIVINGSTON	33
Simple Demonstration of an Analogy to the Electromotive Force, Potential Difference and Resistances in a Circuit	LEONARD B. LOEB AND H. M. HERREMAN	34
Surface Tension Apparatus, Photometer, and Torque Board Design	C. J. OVERBECK	35
Novel Method of Measuring the Coefficient of Dynamic Friction	V. E. EATON	37
Lantern Demonstration of the Triple-Point for Water	W. F. POWERS	40
Discussion and Correspondence:		
Problems of a Survey Course for Teachers College Students	PAUL McCORKLE	41
Reducing Grades to a Common Standard	J. D. SHEA	42
Some Laboratory and Demonstration Aids	C. C. KIPLINGER	43
Mechanics of a Flexible Rope	RAYMOND T. BIRGE	43
Recent Publications:		
Aristotle, Galileo, and the Leaning Tower of Pisa	L. W. TAYLOR	44
Brief Notices		46
Proceedings of the American Association of Physics Teachers:		
St. Louis Meeting, December 29, 1935-January 1, 1936; Abstracts of Papers; Minutes	WILLIAM S. WEBB	48
Annual Report of the Treasurer	PAUL E. KLOPSTEG	52
Available Graduate Appointments and Facilities for Advanced Study in Various Universities and Colleges 1936-1937 (continued)		53
Appointment Service: Positions Wanted by A. A. P. T. Members		54
Digest of Periodical Literature		55
Announcements:		
Survey of Educational Films		25
Reprints of Survey Articles for Class Use		31
Better Financial Outlook for the A. A. P. T.		54

MAY, 1936

Physics at Wellesley	LOUISE S. MCDOWELL	57
Reminiscences of a Scientific Comradeship	GORDON FERRIE HULL	61
Present Conceptions of the Metallic State	L. W. NORDHEIM	66
Acceleration Calculations from Spark-Recorded Data	EMERSON M. PUGH	70
New Physics and the Undergraduate	A. A. KNOWLTON	71
Application of an Electrical Timing Device to Certain Mechanics Experiments	WILLIAM SHOCKLEY	76
Some Uses for the Cathode Ray Oscillograph in an Undergraduate Laboratory Program	WALTER C. BOSCH	81
Teaching the Concept of Optical Imagery	PAUL K. TAYLOR	85
Apparatus, Demonstrations and Laboratory Methods:		
Special Exploring Coil Method of Measuring Magnetic Fields	D. S. AINSLIE	87
Inexpensive Millikan Oil-Drop Apparatus	C. C. KIPLINGER	88
Demonstration Phonodeik	G. G. KRETSCHMAR	90
High Acoustic Output from Tube-Driven Tuning Forks	CHAS. WILLIAMSON AND W. J. EISENBEIS	91
Advanced Laboratory Experiment on the Ionization Potential of Mercury	TREVOR R. CUYKENDALL	93
Teaching Aids		95
Discussion and Correspondence:		
Modification of the Traditional Approach to College Physics	L. W. TAYLOR	96
Another Method of Ranking Students According to Achievement in General Physics	CHARLES W. EDWARDS	97
Rapid Method of Approximating the Area of a Hysteresis Loop	RALPH A. SAWYER	98
Mass and Force as Kinetic Concepts	DUANE ROLLER	99
Color Mixers	JOHN ZELNY	100
Diatomic Scales	ARTHUR TABER JONES	100
Recent Publications		101
Digest of Periodical Literature		103
Appointment Service		104
Announcements:		
Concerning the A. A. P. T. Book of Demonstration Experiments		65
Reprints of Survey Articles for Class Use		69
Kentucky Chapter of the A. A. P. T.		95
Second International Congress for the Unity of Science		100
Back Numbers Wanted		102

CONTENTS

SEPTEMBER, 1936

An Adventure in Research: Copper-Oxide Rectifiers and Their Applications	L. O. GRONDAHL	105
University of Wisconsin Physical Museum	L. R. INGERSOLL	112
Elementary Problems Illustrating the Computation of Charge Distribution, Potential and Capacitance of Conductors	PAUL L. COPELAND	115
Can College Physics Be Popularized?	EDWIN MORRISON	117
Origin of the Horsepower Unit	HARRY L. SMITH	120
Two Experiments on the Saturation Value of the Ion Current Through a Gas. An Interpretation	FREDERIC PALMER, JR.	122
Use of a Current Balance	F. W. WARBURTON	125
Apparatus, Demonstrations and Laboratory Methods:		
Laboratory Experiment on the Analysis of Forced Vibrations	PAUL L. COPELAND	128
Young's Modulus by Vibrations	PAUL F. GAEHR	130
Electric Circuit Analysis Boards	C. R. FOUNTAIN	132
Improvements in Two Standard Pieces of Apparatus	JOHN L. GIPPRICH AND ALFRED H. WEBER	133
Laboratory Type of Traction Electromagnet	SANFORD C. GLADDEN	134
Optimum Conditions for the Owen Bridge	HARRY E. HAMMOND	135
Simple Laboratory Timer	HERSCHEL SMITH	136
Teaching Aids		138
Discussion and Correspondence:		
Effect of an Electric Lens on Water Jets	S. Y. SZE AND L. K. SU	139
Electric Bell Paradox	NOEL C. LITTLE	139
Demonstrating the Principles of Interference	HARALD PERLITZ	140
Laboratory Exercises on Examining Colors	A. DMOCHOWSKI	141
Reviving the Sonometer	THOMAS H. OSGOOD	142
Motion of a Weight with Attached Rope	W. W. SLEATOR	143
Experiment to Demonstrate that "Friction" Electricity Depends on Contact Potential	STANLEY ANDERSON	144
Demonstration of the Pile Driver	ANDREW LONGACRE	144
Recent Publications		146
Digest of Periodical Literature		149
Appointment Service		152
Announcements:		
Cooperation with Science Service		119
Concerning the Program for the Atlantic City Meeting		124
Temporary Change in Address of Editorial Office		127
Reprints of Survey Articles for Class Use		129
Award for Best Popular Science Manuscript		145

SEPTEMBER, 1936, SUPPLEMENT

The 1935-1936 College Physics Testing Program	153
---	-----

DECEMBER, 1936

Training of Physicists for Industry—From the Point of View of the Educator	HOMER L. DODGE	167
Plane and Solid Angles. Their Pedagogic Value When Introduced Explicitly	J. B. BRINSMADE	175
Professor James Beebee Brinsmade, 1884-1936	W. E. McELFRESH	180
Early History and the Methods of Infrared Spectroscopy	R. BOWLING BARNES AND LYMAN G. BONNER	181
High School Physics as a Preparation for College Physics	L. B. HAM	190
Gibbs and Mollier Thermodynamic Surfaces	M. W. ZEMANSKY AND R. C. HERMAN	194
Rational-Sided Right Triangles	RALPH HOYT BACON	197
Apparatus, Demonstrations and Laboratory Methods:		
Electrically Driven Tuning Fork as a Source of Constant Frequency for the Precise Measurement of Short Intervals of Time	R. B. DOW	199
Intermittent Air-Blast Method of Exciting Transverse Vibrations in a Bar	B. W. CURRIE	201
Double Bulb Neon Oscillograph	JAMES F. KOEHLER	202
Some Demonstrations of Spinning Tops and Gyroscopes	ROBERT C. COLWELL	203
Mechanical Vibrator for Demonstrating Standing Waves	WILFRID J. JACKSON AND FRANK R. PRATT	205
Determination of the Speed of Sound by the Fizeau Toothed Wheel Method	HAROLD K. SCHILLING	206
Free-Fall Apparatus Which Uses Photographic Recording	GLENN F. ROUSE	209
Indicating Lantern Slide Color Mixer	JOHN J. HEILEMANN	211
Continuously Variable Diaphragm for Use in Spherical Aberration Studies	W. P. GILBERT	212
Model of Magnetization	F. W. WARBURTON	213
Easily Constructed Fresnel Mirrors	H. M. REESE	215
Recent Publications		216
Discussion and Correspondence:		
Acceleration Calculation from Spark Recorded Data	PHILIP RUDNICK	217
Textbook Discussions on Lightning	J. C. JENSEN	217
Laboratory Experiments on the Viscosity of Air—An Undergraduate Project	DUANE ROLLER AND DEAN WOOLDRIDGE	218
Digest of Periodical Literature		219
Teaching Aids		221
Author Index to Volume 4		222
Analytic Subject Index to Volume 4		223
Announcements:		
A. A. P. T. Award for Notable Contributions to Teaching		180
Appointment Service: Positions Wanted by A. A. P. T. Members		198
Available Graduate Appointments and Facilities for Advanced Study		198
Reprints of Survey Articles for Class Use		208